IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	
Solf et al.	
Serial No.: 10/526,513	Group Art Unit: 2624
Filed: March 4, 2005	Examiner: Nancy Bitar
For: IMAGING SYSTEM AND METHOD FOR OPTIMIZING AN X-RAY IMAGE	**Board of Patent Appeals and Interferences**
Confirmation No.: 8935	

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

In support of the Notice of Appeal filed on October 14, 2008, and pursuant to 37 C.F.R. § 41.37, Appellants present this appeal brief in the above-captioned application.

This is an appeal to the Board of Patent Appeals and Interferences from the Examiner's final rejection of claims 1-10, 12 and 14 in the Final Office Action dated May 15, 2008. The appealed claims are set forth in the attached Claims Appendix.

1. Real Party in Interest

This application is assigned to Koninklijke Philips Electronics N.V., the real party in interest.

2. Related Appeals and Interferences

There are no other appeals or interferences that would directly affect, be directly affected, or have a bearing on the instant appeal.

3. Status of the Claims

Claims 1-10, 12 and 14 have been rejected in the Final Office Action. Claims 11 and 13 have been objected to in the Final Office Action. The final rejection of claims 1-10, 12 and 14 are being appealed.

4. Status of Amendments

All amendments submitted by Appellants have been entered.

5. Summary of Claimed Subject Matter

The present invention, as recited in independent claim 1, is directed to a method of optimizing a two-dimensional image of a body volume which contains an object. (See, Specification, p. 1, ll. 1-2; p. 2, ll. 5-7, ll. 13-15; p. 3, ll. 3-5). The method comprising: acquiring a first two-dimensional image of the body volume with the object in the body volume. (See, Specification, p. 4, ll. 5-16; p. 6, ll. 18-28; Fig. 1). The method further comprising: acquiring a three-dimensional representation of feasible locations of the object within the body volume. (See, Specification, p. 2, ll. 16-18; p. 4, ll. 2-4, l. 20; p. 7, ll. 4-13). Determining a current position of the object in the body volume based on the first two-dimensional image. (See, Specification, p. 2, ll. 19-22; p. 3, ll. 16-19; p. 5, ll. 24-27). Associating the current position of the object with the three-dimensional representation. (See, Specification, p. 2, ll. 19-22; p. 2, ll. 5-7; p. 7, ll. 14-20). Determining imaging parameters which are optimum in respect of the position of the object based on the three-dimensional representation. (See, Specification, p. 2, ll. 23-25; p. 3, ll. 20-28; p. 4, ll. 21-23; p. 5, ll. 28-30). Controlling movement of an imaging system based on the imaging parameters. (See, Specification, p. 1, ll. 1-2; p. 2, ll. 5-7, ll. 13-15; p. 3, ll. 3-5).

Generating a second two-dimensional image of the body volume based on the optimum imaging parameters. (See, Specification, p. 4, ll. 24-26).

The present invention, as recited in independent claim 3, is directed to an imaging system for forming a two-dimensional image of a body volume which contains an object. (See, Specification, p. 1, ll. 1-3, 11-13; p. 4, 17-18; p. 5, ll. 24-27). The system comprising: a data processing unit with a memory which stores a three-dimensional representation of feasible locations of the object within the body volume. (See, Specification, p. 4, ll. 17-20). The data processing unit being adapted to: determine a current position of the object in the body volume based on a first two-dimensional image of the body volume. (See, Specification, p. 4, ll. 21-23). The data processing unit being further adapted to: determine imaging parameters which are optimum in respect of a current position of the object based on the three-dimensional representation. (See, Specification, p. 2, ll. 19-22; p. 3, ll. 16-19; p. 4, ll. 21-23; p. 5, ll. 24-27). The data processing unit being further adapted to: control movement of the imaging system based on the imaging parameters to generate a second two-dimensional image. (See, Specification, p. 4, ll. 24-26).

6. Grounds of Rejection to be Reviewed on Appeal

I. Whether claims 1-10, 12 and 14 are unpatentable under 35 U.S.C. § 103(a) over U.S. Pat. Pub. No. 2002/0049375 to Strommer et al. (hereinafter "Strommer") in view of U.S. Pat. No. 5,951,475 to Guerziec et al. (hereinafter "Guerziec").

7. Argument

I. The Rejection of Claims 1-10, 12 and 14 Under 35 U.S.C. § 103(a) Over Strommer in view of Guerziec Should Be Reversed.

A. The Examiner's Rejection

In the Final Office Action, the Examiner rejected claims 1-10, 12 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Strommer in view of Guerziec. (See 05/15/2008 Office Action, p. 2-7).

Strommer is directed to a medical imaging system. (See Strommer Abstract). The medical imaging system includes a processor, an MPS, a two-dimensional imaging system and an inspected organ monitor interface. (See Strommer, p. 3, ¶ 0037). The imaging system includes an image detector that may be firmly attached to an imaging catheter. (See Strommer, p. 4, ¶ 0037).

Gueziec is directed to a method and system for registering two dimensional fluoroscopic images with a three dimensional model of a surgical tissue of interest. (See Gueziec Abstract).

B. The Cited Patents Do Not Disclose Acquiring A Three-Dimensional Representation Of Feasible Locations Of The Object Within The Body Volume, As Recited In Claim 1.

Claim 1 recites "acquiring a three-dimensional representation *of feasible locations of the object* within the body volume." The Examiner asserts that this recitation is taught by Strommer based on the disclosure that, "in processor 234, the three dimensional location and orientation of the image is detected where MPS system, figure 1, detects the three dimensional location and orientation of the image detector using MPS sensor 162, paragraph [151]." (See 05/15/2008 Office Action, p. 3). Appellants respectfully disagree.

Strommer describes detecting and locating a single location and orientation of the actual image detector using the MPC sensor. Strommer does not describe detecting the feasible locations *(plural)* of the image detector using the MPC sensor but rather the **single actual** location and orientation of the image detector. (See Strommer, p. 10, ¶ 0151). Notably, claim 1 further recites "determining a current position of the object in the body volume…" which is distinguishable from "acquiring…feasible locations… of the object." Thus, claim 1 distinguishes a "current position" from "feasible locations." Strommer, at most, teaches the current location of the image detector.

The Examiner in the Advisory Action stated that "Strommer teaches 'The location and orientation of each of the two dimensional images are directly determined from the location and orientation of the transducer.'" (See 8/21/08 Advisory Action, p.2). The Applicants agree that Stommer teaches this quotation. However, this merely reinforces the fact that Strommer is only finding the actual location of the image detector and not the feasible locations. The Examiner further argues that the determining of successive locations meets the limitation of feasible locations. (See, Id.). However, these successive locations are merely a record of where the image detector has been, not feasible locations where it could be. In Strommer, there is no possibility or probability of the image detector being in a particular feasible location. By virtue of the detection of the image detector, it is definitely in the detected location. Accordingly, the detection of the actual location of the image detector in Strommer neither teaches nor suggests "acquiring a three-dimensional representation of feasible locations of the object within the body volume," as recited in claim 1.

C. The Cited Patents Do Not Disclose Associating The Current Position Of The Object With The Three-Dimensional Representation, As Recited In Claim 1.

Claim 1 recites "associating the current position of the object with the three-dimensional representation." The Examiner asserts that this recitation is taught by Strommer. (See 05/15/2008 Office Action, p. 3). However, there is no teaching or suggestion in Strommer that the position of the object is associated with the three-dimensional image using the recited steps. The Examiner states that "main computer 102 associates each detected image with the location and orientation information thereof and the organ timing signal." (See Id.). However, that is not what the disclosure of Strommer states. Strommer states:

> In procedure 236, each detected *two-dimensional image* is associated with the location and orientation information thereof and the organ timing signal at the time the two-dimensional image was taken. With reference to FIG. 1, main computer 102 receives the ECG signal, the *acquired two-dimensional images* and the location and orientation of *each two-dimensional image*. Main

computer 102 associates each detected image with the location and orientation information thereof and with the organ-timing signal.

Strommer, ¶ [0152].

The above cited portion of Strommer clearly refers to the two-dimensional images. There is no teaching or suggestion within Strommer of "associating the current position of the object with the three-dimensional representation" as recited in claim 1.

D. The Cited Patents Do Not Disclose Controlling Movement Of An Imaging System Based On The Imaging Parameters, As Recited In Claim 1.

Claim 1 recites "controlling movement of an imaging system *based on the imaging parameters*." The Examiner asserts that this recitation is taught by Strommer because "the physician controls the movement of the surgical tool, paragraph [0154]." (See 05/15/2008 Office Action, p. 3). Appellants respectfully disagree.

Strommer describes modifying the two-dimensional images by discarding a portion thereof, which represents the surgical tool. (See Strommer, p. 10, ¶ 0154). The main computer 102 determines a three-dimensional space, which is occupied by surgical tool 120, according to the information which MPS sensor 162_1 acquires and according to data respective of the physical surgical tool 120. (See Strommer, p. 10, ¶ 0154). The main computer then discards the image of the surgical tool 120 from the two dimensional images. (See Strommer, p. 10, ¶ 0154).

As the Examiner has stated, "the physician controls the movement of the surgical tool." However, upon movement of the surgical tool by the physician the main computer must determine the new three-dimensional space occupied by the surgical tool and discard the new image of the surgical tool. The physician may move the surgical tool in Strommer **without any regard for the main computer** and any movement by the physician will cause the main computer to perform additional modifications to images. That is, the movement described by Strommer is not "based on the imaging parameters." Thus, Appellants respectfully submit that

Strommer does not teach or suggest "controlling movement of an imaging system based on the imaging parameters," as recited in claim 1.

Appellants respectfully submit that Gueziec does not cure the above deficiencies of Strommer. Therefore, Appellants respectfully submit that claim 1 is patentable over Strommer and Gueziec, either alone or in combination. Accordingly, Appellants respectfully request that the Board overturn the Examiner's rejection of claim 1. Because claims 2 and 12 depend from, and therefore include all the limitations of claim 1, it is respectfully submitted that these claims are also allowable for at least the same reasons given above with respect to claim 1.

E. The Cited Patents Do Not Disclose The Recitations of Claim 3

Similar to claim 1, independent claim 3 recites "a data processing unit with a memory which stores a three-dimensional representation of feasible locations of the object within the body volume, the data processing unit being adapted to: … control movement of the imaging system based on the imaging parameters to generate a second two-dimensional image." Thus, Appellants respectfully submit that claim 3 is allowable for at least the same reasons as claim 1. Because claims 4-10 and 14 depend from and therefore include all of the limitations of claim 3, it is respectfully submitted that these claims are also allowable for at least the same reasons given above with respect to claim 3.

Conclusion

For the reasons set forth above, Appellants respectfully request that the Board reverse the rejection of the claims by the Examiner under 35 U.S.C. § 103(a), and indicate that claims 1-10, 12 and 14 are allowable.

Respectfully submitted,

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CLAIMS APPENDIX

1. (Previously Presented) A method of optimizing a two-dimensional image of a body volume which contains an object, the method comprising:

acquiring a first two-dimensional image of the body volume with the object in the body volume;

acquiring a three-dimensional representation of feasible locations of the object within the body volume;

determining a current position of the object in the body volume based on the first two-dimensional image;

associating the current position of the object with the three-dimensional representation;

determining imaging parameters which are optimum in respect of the position of the object based on the three-dimensional representation; and

controlling movement of an imaging system based on the imaging parameters; and generating a second two-dimensional image of the body volume based on the optimum imaging parameters.

2. (Previously Presented)A method as claimed in claim 1, wherein the two-dimensional image is a projection of the body volume which has been generated by means of X-rays, and wherein the second two-dimensional image is generated without using external markers for comparing images.

3. (Previously Presented)An imaging system for forming a two-dimensional image of a body volume which contains an object, the system comprising:

a data processing unit with a memory which stores a three-dimensional representation of feasible locations of the object within the body volume, the data processing unit being adapted to:

determine a current position of the object in the body volume based on a first two-dimensional image of the body volume;

determine imaging parameters which are optimum in respect of a current position of the object based on the three-dimensional representation; and

control movement of the imaging system based on the imaging parameters to generate a second two-dimensional image.

4. (Previously Presented)An imaging system as claimed in claim 3, further comprising an X-ray apparatus with an X-ray source and a detector which are attached to a movable C-arm, wherein the second two-dimensional image is generated without using external markers for comparing images.

5. (Previously Presented)An imaging system as claimed in claim 4, wherein the X-ray apparatus includes adjustable diaphragms whose adjustment forms part of the imaging parameters optimized by the data processing unit.

6. (Previously Presented)An imaging system as claimed in claim 3, wherein the data processing unit is coupled to at least one of an ECG, a respiration sensor and a localizing device for the object.

7. (Previously Presented)An imaging system as claimed in claim 3, wherein the imaging parameters comprise at least one of a sectional plane of an image and a projection direction.

8. (Previously Presented)An imaging system as claimed in claim 3, wherein the imaging parameters define a sectional plane, a projection direction, the position of a radiation source, the position of an imaging radiation detector, the shape of an imaging window, the position of radiation-attenuating diaphragm elements, variances in the radiation field across an irradiated surface, a radiation quality, a radiation intensity, the current and/or the voltage of a radiation source and/or an exposure time.

9. (Previously Presented)An imaging system as claimed in claim 3, wherein the feasible locations of the object are vessels within a biological body volume, and that the data processing unit is arranged to define the optimum imaging parameters causing the segment of the vascular tree in which the object is situated to be projected essentially in a planar fashion in the two-dimensional image.

10. (Previously Presented)An imaging system as claimed in claim 3, wherein it includes a device for the formation of images and is arranged to display the two-dimensional image in superposed form together with an image formed from the three-dimensional representation with completely the same or partly the same imaging parameters, the image formed from the three-dimensional representation preferably reproducing an area which is larger than that reproduced by the two-dimensional image.

11. (Previously Presented)The method of claim 1, further comprising generating the second two-dimensional image in a shape of a rectangle, wherein the object has a tip in proximity to a first short side of the rectangle, and wherein a vascular segment of the body volume extends to a second short side of the rectangle.

12. (Previously Presented)The method of claim 1, further comprising generating the second two-dimensional image without using back projection of the first two-dimensional image.

13 (Previously Presented)The imaging system of claim 3, wherein the second two-dimensional image has a shape of a rectangle, wherein the object has a tip in proximity to a first short side of the rectangle, and wherein a vascular segment of the body volume extends to a second short side of the rectangle.

14. (Previously Presented) The imaging system of claim 3, wherein the second two-dimensional image is generated without using back projection of the first two-dimensional image.

EVIDENCE APPENDIX

No evidence has been entered or relied upon in the present appeal.

RELATED PROCEEDING APPENDIX

No decisions have been rendered regarding the present appeal or any proceedings related thereto.